Year 1 Assessment of the RISD-TI Intervention Model

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June 22, 2006

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Executive Summary

- Initial TAKS results show that Lake Highlands Junior High School's 2006 mathematics scores improved over 2005's. Almost 33% of the students who participated in the intervention passed the 2006 TAKS after failing the previous year.

- The LHJH teachers' math knowledge, as measured by pre- and post-intervention LMT assessments, significantly increased after a year of collaboration and professional development sessions provided by TI.

- Year-end teacher mathematics knowledge as measured by the LMT, and growth in LMT scores in the intervention teachers were both positively associated with the TAKS performance of their students.

- Teachers reported increased expectations for student performance and improved teaching after receiving content training in math. Teachers stated that the math training sessions improved their understanding as they could better explain connections to students and were able to understand sequencing of the proofs underlying a process.

- Parents noted a positive difference in children's math performance and attitude. Students who had not been successful in math made noticeable progress.

- The more immediate availability of diagnostic data helped teachers improve instruction by allowing them to determine frame length and starting point, spiral in concepts not mastered sooner and provide extra practice through warm-ups. Some teachers reported misalignment between unit benchmarks and the district curriculum on the TEKS, and unit diagnostics and the district curriculum or the TEKS.

- Some teachers were critical of site administrative support and increasingly so across the intervention. Many thought the administrators did not realize the day-to-day planning and learning activities necessary for a successful intervention. Teachers were most critical of site administrators for not managing discipline better as students who constantly disrupted class were not removed.

- Teachers agreed that use of the TI-Navigator increased student engagement, reduced many behavioral problems in class, and shifted responsibility for learning to the students. Teachers commented that students spent more time working through problems, were able to realize corrections more quickly and retain information. The calculator experience also increased their algebra readiness.

- The real time data and anonymous features of the technology increased student participation dramatically, including group work and student support for one another. The technology allowed teachers more time and they were able to focus on questioning skills and student discussion while more and higher level concepts could be covered.

- The power block (extra 50 minutes of instruction) helped create relationships, provided more hands-on learning and development of problem solving strategies while engaging students in more activities. Teachers reported that the increased time changed problem solving effort and approach, and increased student expectations and performance.

- Important shifts occurred in teacher perceptions from mid-intervention to year-end. Teachers grew more critical of the administration and the seeming lack of appreciation for their increased efforts. It became clear to all teachers that the power-block and the real time data and anonymity features of the TI-Navigator were essential to increasing student effort and performance. While four to six of the teachers were positive about the intervention components at mid-year, 6 to 8 were confident of improvements in their own and student performance by year end.

Year 1 Assessment of the RISD-TI Intervention Model

Overview

During this past year, Lake Highlands Junior High School, the Richardson Independent School District and Texas Instruments, Inc. partnered to develop a focused intervention that would improve mathematics instruction and test outcomes at Lake Highlands. Utilizing a block schedule class design, additional instruction time, more collaboration between teachers throughout the year, focused professional development sessions, and the employment of the TI-Navigator, the school sought to increase the passing rate of at-risk students enrolled at Lake Highlands.

Lake Highlands' Performance

Students who failed to pass the TAKS mathematics assessment in 2005 were placed in 100 minute block classes which employed the TI-Navigator system to assist in instruction. Teachers assigned to these classes met frequently to develop and share their knowledge and solve problems, and these teachers also received additional professional development sessions with a math expert from Texas Instruments.

To get a sense of Lake Highlands Junior High School's standing, we can view the school against other junior highs in the Richardson Independent School District. Table 1 provides comparative data on demographic categories for RISD junior high schools, listing the total number of students tested this year, the ethnic group percentages and proportion of the student body classified as economically disadvantaged. Lake Highlands had the second largest percentage of African American students, somewhat fewer white students, and an above average proportion of economically disadvantaged students taking the TAKS this year.

Table 1: Response Totals by Campus for 2006 TAKS testing period (overall, ethnic group and economic disadvantaged percentages)

Campus	Total tested	Asian	Afr. Amer.	Hispanic	White	Other	Econ. Dis.
Apollo	752	16%	18%	20%	46%	0%	35%
Forest Meadow	577	4%	50%	22%	23%	1%	62%
Lake Highlands Junior High	588	2%	42%	19%	37%	0%	42%
Liberty	648	18%	38%	22%	21%	1%	60%
North	527	4%	7%	25%	63%	1%	29%
Parkhill	461	3%	7%	23%	66%	1%	26%
West	518	5%	21%	39%	35%	0%	47%
Westwood	545	6%	23%	32%	39%	0%	43%

Let us consider TAKS results across the RISD junior high schools for 2006. In table 2 below, the percentage of students in the 7th and 8th grades who met the minimum passing standard can be seen along with the percentage change from the 2005 results for each group at the schools (note that these numbers reflect all students tested and including those who joined the district as hurricane evacuees).

Table 2: 2006 TAKS Met Minimum Percentage by Grade
(with percentage change from 2005 in parentheses)

Campus	Overall	Afr. Amer.	Hispanic	White	Econ. Dis.
7th Grade					
Apollo	85 (+9)	73 (+29)	73 (-2)	92 (+12)	71 (+8)
Forest Meadow	58 (+5)	43 (+12)	53 (+3)	92 (+2)	48 (+13)
Lake Highlands JH	70 (+6)	51 (+11)	65 (+12)	92 (0)	54 (+8)
Liberty	69 (-3)	51 (-14)	70 (+16)	89 (-3)	61 (-3)
North	90 (+8)	71 (+26)	77 (+1)	96 (+7)	78 (+9)
Parkhill	92 (0)	68 (+4)	86 (+8)	97 (-2)	78 (+8)
West	78 (+4)	72 (+5)	71 (+8)	87 (+1)	67 (+1)
Westwood	83 (+2)	73 (+3)	73 (-1)	97 (+4)	72 (+1)
8th Grade					
Apollo	78 (+1)	51 (+1)	74 (+4)	86 (+3)	67 (+2)
Forest Meadow	53 (-2)	36 (-6)	43 (+16)	92 (+2)	38 (+1)
Lake Highlands JH	63 (+3)	43 (+2)	46 (+6)	92 (+4)	47 (+6)
Liberty	71 (0)	54 (+5)	63 (+2)	86 (+8)	62 (+3)
North	81 (-4)	48 (-5)	70 (+7)	90 (-4)	65 (0)
Parkhill	93 (+4)	54 (-21)	88 (+19)	98 (+3)	82 (+9)
West	80 (+6)	70 (+1)	72 (+9)	94 (+8)	73 (+8)
Westwood	93 (+14)	56 (-17)	68 (+7)	95 (+6)	63 (0)

Lake Highlands showed improvement this year as the percentage of students meeting the minimum passing standard increased over last year for both the 7th and 8th grade. In addition, improvements were also made in each of the relevant subgroups in each grade level, although the 7th grade seems to show better performance overall and a more dramatic improvement for African American and Hispanic students.

A comparison of results across campuses over the past two years is informative since the intervention was focused on students who did not pass the TAKS in the previous year. Table 3 shows the 2005 performance of students who failed the TAKS in 2004 across the junior high schools. At every campus, less than a third of the students who did not make the standard in 2004 went on to pass in 2005, and Lake Highlands had the least success with this group of students. This comparison illustrates the performance prior to the implementation of this intervention project.

Table 3: 2005 TAKS Math Performance by Students who did not meet 2004 minimum

School	Number of Students not meeting 2004 minimum	Met 2005 Minimum	Did not meet 2005 minimum
Lake Highlands Junior High	101	13.9 %	86.1 %
Richardson Junior High	55	16.4 %	83.6 %
Richardson West Junior High	59	23.7 %	76.3 %
Richardson North Junior High	28	14.3 %	85.7 %
Forest Meadow Junior High	116	14.7 %	85.3 %
Westwood Junior High	48	22.9 %	77.1 %
Liberty Junior High	62	24.2 %	75.8 %
Apollo Junior High	67	28.4 %	71.6 %
Parkhill Junior High	25	28.0 %	72.0 %

Using the 2006 results, table 4 shows a similar comparison, using students who were assigned to the block classes at Lake Highlands and comparing their 2006 TAKS performance with students at other campuses who failed the 2005 TAKS.

Table 4: 2006 TAKS Math Performance by Students who did not meet 2005 minimum

School	Number of Students not meeting 2005 minimum	Met 2006 Minimum	Did not meet 2006 minimum
Lake Highlands Junior High	119	32.7 %	67.3 %
Richardson West Junior High	82	36.6 %	63.4 %
Richardson North Junior High	50	36.0 %	64.0 %
Forest Meadow Junior High	139	19.4 %	80.6 %
Westwood Junior High	70	28.6 %	71.4 %
Liberty Junior High	115	31.3 %	68.7 %
Apollo Junior High	106	43.4 %	56.6 %
Parkhill Junior High	27	63.0 %	37.0 %

Overall, Lake Highlands made great progress in increasing the pass rate of this at-risk group and now places in the middle rather than the bottom of the district's junior high schools in mathematics.

The TI-RISD intervention also focused on improving teacher knowledge, using professional development opportunities and collaborative sessions to assist the Lake Highlands mathematics teachers. The impact in this area can be seen in the teachers' scores on the Learning Mathematics for Teaching project assessment (the LMT) that was administered prior to this year and then again after the TAKS testing period. Table 5 lists the LMT averages for the mathematics teachers participating in the intervention program at Lake Highlands across 2005 and 2006, along with the growth illustrated on each LMT domain. Note that the LMT scores are represented in standard deviation units and are normalized in line with a national sample of mathematics teachers who completed the LMT measures over the last two years. The average score is calibrated to zero, and scores can be negative or positive in value, representing results that would be below (negative) or above (positive) average.

Table 5: LMT Averages and Growth from 2005 to 2006 at Lake Highlands Junior High School

LMT Dimension	Average	Standard Deviation	Range
2005 Numbers and Operations domain	-0.0244	0.707	2.07
2005 Patterns, Functions, and Algebra domain	-0.2905	0.772	2.01
2006 Numbers and Operations domain	0.8323	0.673	2.22
2006 Patterns, Functions, and Algebra domain	0.3968	0.592	1.49
Growth in Numbers and Operations score, 2005-06	0.8567	0.300	0.95
Growth in Patterns, Functions, and Algebra score, 2005-06	0.6874	0.462	1.14

All but one of the teachers who completed the pre- and post-intervention assessment showed growth on the LMT domains, with the outlier showing a number of anomalies on the second part of the questionnaire. With her data excluded, the growth from pre- to post-test is significant for both domains (for Numbers and Operations, $\mathbf{t_{(5)}} = 7.14$, $\mathbf{p} < .001$; for Patterns, Functions and Algebra, $\mathbf{t_{(5)}} = 3.64$, $\mathbf{p} < .01$).

The end-of-year LMT scores and growth LMT scores for these teachers also relate to their students' performance on this year's TAKS. The following charts graphically illustrate how each LMT domain and growth in the domains over the year relate to class performance on the 2006 TAKS for these block classes.

Chart 1: Numbers and Operations 2006 LMT Scores by TAKS Math Met Minimum Percentage (r = .38)

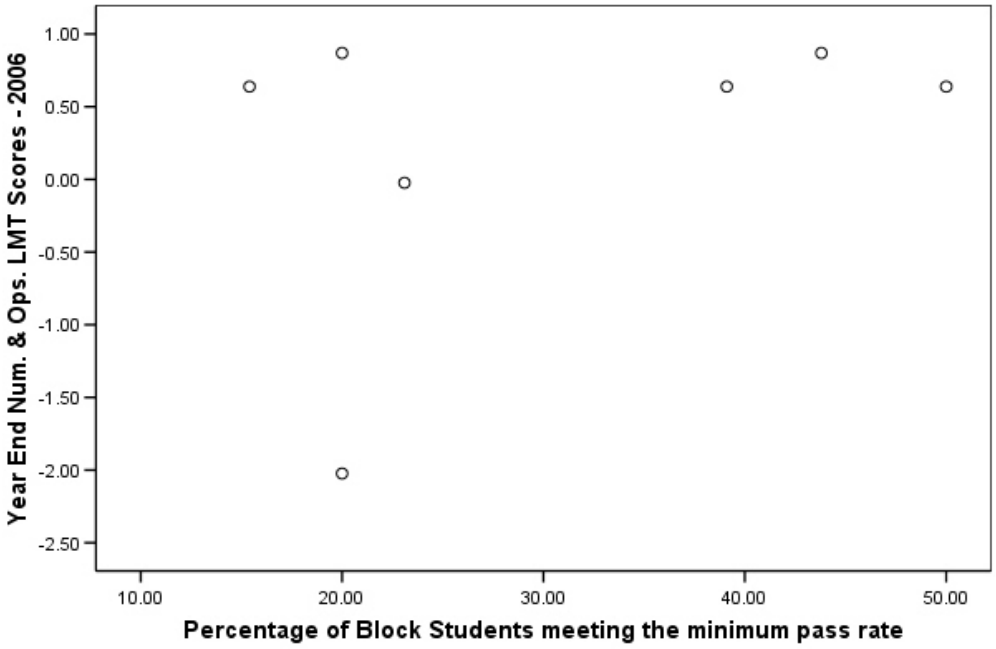


Chart 2: Patterns, Functions and Algebra 2006 LMT Scores by TAKS Math Met Minimum Percentage (r=.56)

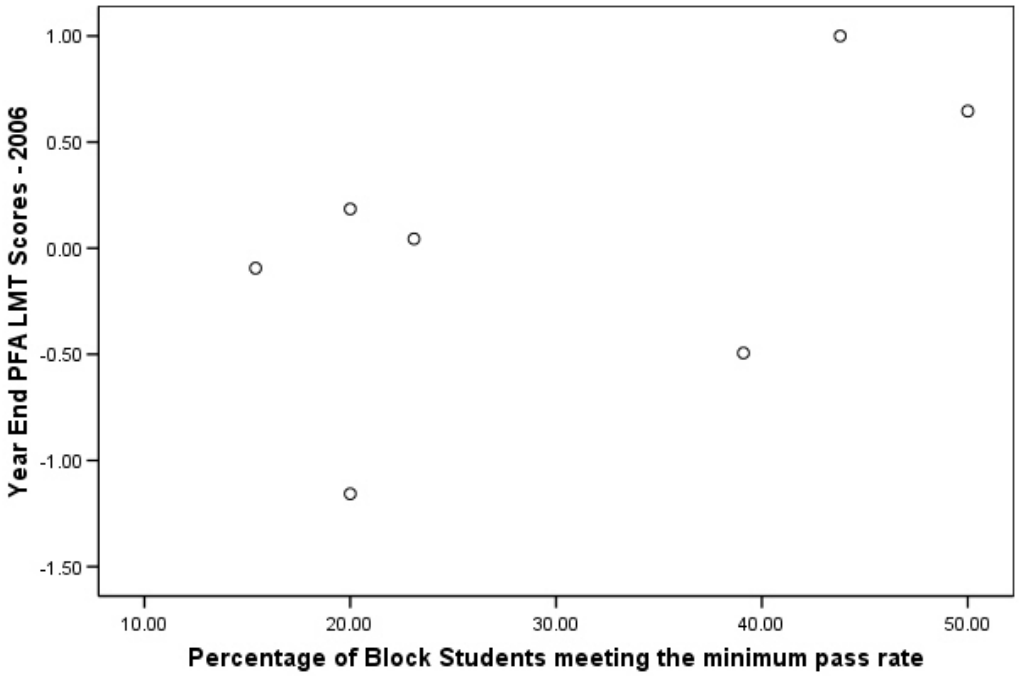


Chart 3: 2006 Number and Operations LMT Score Growth by TAKS Math Met Minimum Percentage (r = .53)

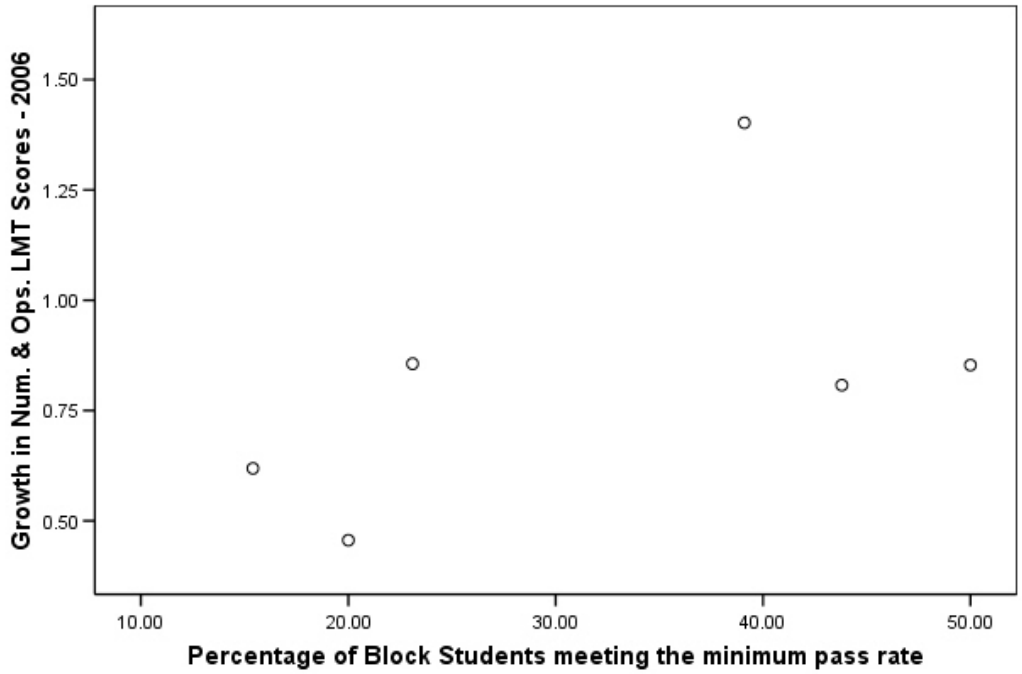
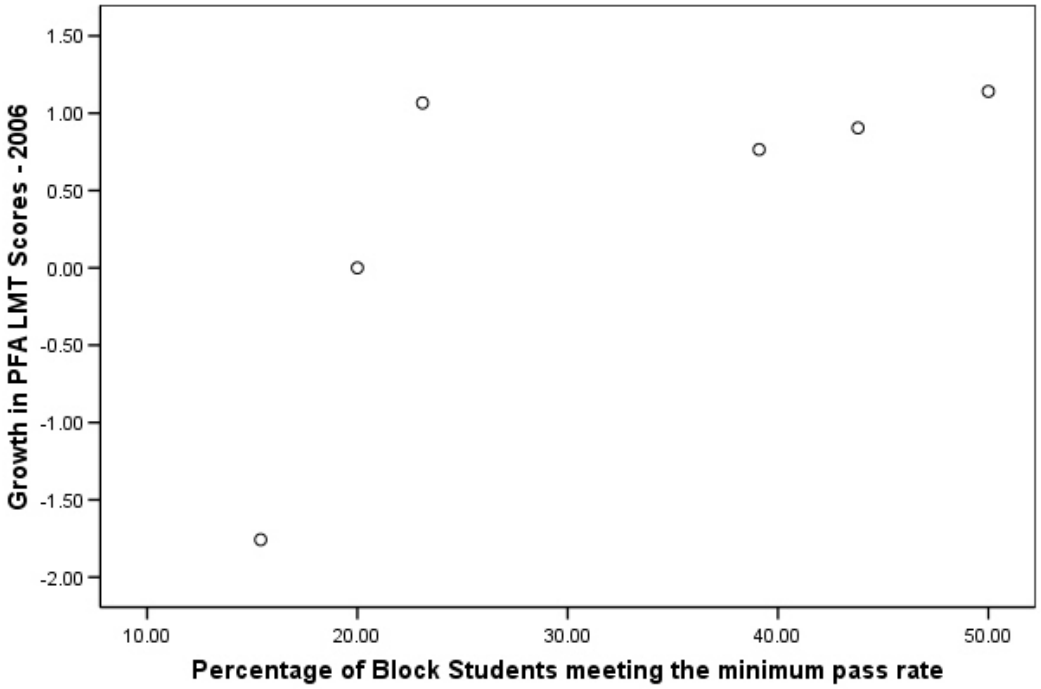


Chart 4: 2006 Patterns, Functions and Algebra LMT Score Growth by TAKS Math Met Minimum Percentage (r = .72)



The patterns in both the year-end scores and growth measures show a positive trend with teachers scoring higher or showing more growth on the domains also having classes with a higher percentage meeting the minimum passing level on the TAKS.

Teacher Perceptions

The teachers completed a survey at mid-year and year-end that addressed the effectiveness of the intervention components. They were asked to detail successes and challenges while providing suggestions for improvement. The survey appears at the end of this report in appendix A, and full tables of the results appear in appendix B.

Problem solving activities and grouping

In the mid-year analysis, the teachers reflected on problem solving and grouping activities. It was unclear whether problem-solving activities used by students in the classroom were different from last year or not. The four new teachers could not make this comparison and of the remaining four, two suggested that the practices were not different. Types of problem solving activities used appeared to vary across teachers.

The labels used to identify grouping strategies seem to vary as well, although the described activities often included reviews and assessments, less so learning new concepts or pursuing higher level thinking.

Teachers noted changes in student behavior as a result of grouping strategies; one suggested a deeper understanding of the subject matter, another commented that leadership skills emerge as over achievers tried to excel. Two teachers mentioned increased student (social) motivation or willingness to listen to peers. Three commented on difficulties: students only wanting to do the work they are assigned, students needing to wait on the previous person's work to do their part, students just visiting and then copying work while one carries the group, students abusing the group format.

Teachers mostly reported using flexible grouping without labeling of groups, followed by flexible grouping between groups when a skill is mastered. Students were assigned to groups in various ways: skill level and personality, seating proximity, randomly, self selection and typically 2-4 in size, although one teacher reported assigning groups of 4-6 students. While teachers agree that competitive and cooperative settings are useful for learning math, they mostly report creating cooperative settings of 3 to 4 students.

Efficacy and the TI Intervention Model

Research suggests that students perform to their own and others expectations. So following teacher expectations for student success in math across this study is important. When we sampled the broader population of RISD math teachers in April 2005 we found expectations in the district to be low overall, yet the eight math teachers at Lake Highlands reported surprising confidence both prior to the study and at mid-intervention. Furthermore, at the end of year one, 100% reported that they can successfully teach 90% or more of their students grade level math.

One teacher moved from uncertainty at mid-year to confidence about teaching math and doing so with ELL by year end. All but one agreed that 90% or more of their students can learn grade level math. The outlier respondent reports confidence with her own performance but not that of the students, the administration or the intervention.

The teachers further reported at mid-year and year-end establishing a significant relationship with students who have difficulty in math and that they inspire their students. Perhaps most importantly, six teachers agreed that their expectations for student performance have increased since receiving training this past summer and fall. Two were uncertain.

Some unexpected but perhaps noteworthy shifts in perceptions surfaced from mid-year to year-end about teaching success. Four teachers reported not feeling valued by the administration at year-end verses two at mid-year. Furthermore, from mid-year to year-end teachers noted that instructional support has changed, with at least half uncertain if it is based on benchmark data and three suggesting that they do not receive support in time to deliver content successfully.

How has the TI intervention model assisted those teaching math? At mid-year teachers mention aspects of the training that helped them. One spoke of the class on equitable classroom by Harris. Two mentioned the staff development sessions with Damaske, the common planning time and the technology as being helpful. Another spoke of the laid-back feeling of the sessions, of feeling comfortable asking questions. Another spoke of how she viewed math instruction differently now, namely that helping students look at new concepts in different ways and following concept introduction with technological application had made a marked difference in learning.

At year-end the teachers spoke more about practices in the classroom, the technology, and student performance. Teachers commented that the technology had engaged students who were not otherwise, allowed for monitoring and immediate assessment, accelerated content and increased student responsibility. One commented, “students can create and learn visually.” The teachers reported that the power block (extra 50 minutes of instruction) had helped to create relationships, provided more hands-on-learning and problem solving strategies while it engaged students in more activities. One teacher noted that the intervention “has given me better ideas for teaching lower level students and made learning more interesting.” Another reported, “the students seem to have become better problem solvers”.

At mid-year one teacher reported not using the technology and needing help. By year-end this teacher noted success with the technology, but was critical of the training sessions (not being included), block composition, instructional and administrative support, but not of her progress or that of her students even though neither were relatively good.

Teachers reported that components which have raised their confidence include the common planning time, talking about the lessons, having the technology to demonstrate lessons, support in the classroom, having someone to call with questions, the unit diagnostics and weekly meetings with Paula Moeller. Each of these factors was mentioned by a teacher at mid-year. At year-end the focus shifted as teachers spoke of the importance of the training sessions, but also

the power block and instant feedback on student work. One even noted increased performance: "Going from 0 to 53% passing TAKS!" that raised teacher confidence.

Campus Administration

While half the teachers reported feeling valued by the administration throughout the intervention, two at mid-year and four at year-end did not. At mid-year teachers complained about an increased work-load without administrative support or the lack of encouragement for increased performance from students. At year-end five of the teachers made comments about the administration not understanding the amount of time required to plan and execute the intervention. While one suggested administrators seemed resentful, others commented that administrators knew of the extra training involved and Saturday sessions but did not realize the day to day planning and learning activities necessary. Others commented, however, on reduced duties. When asked about additional administrative support, four teachers requested improvements in handling discipline, specifically better procedures or support in removing students who constantly disrupt.

Parent Understanding and Response

It is common for teachers to report low efficacy based upon projections made from parent involvement and economic status. This is generally not the case with Lake Highlands where the math teachers reported at mid-year and year-end that parents understand the importance of learning math. In addition, several teachers provide positive comments from parents. Parents have called to report that their child has shown interest in math this year, in part because of the new technology; others are pleased with the block format suggesting that their child was never good in math before. Parents have e-mailed teachers describing a change in their child because of the model. "The parents tell me how excited their child is now about succeeding in mathematics." The pulse from parents is positive; they are excited.

Instructional Support and Content Knowledge

At mid-year several teachers suggested that they did not have the instructional support necessary to teach all students. Only one teacher agreed that content sessions with the mathematician increased her mathematical understanding and that the sessions helped her teach effectively. This changed dramatically by year-end where all but one teacher reported having the instructional support necessary to successfully teach all students math. Six teachers stated that the content sessions had increased their mathematical understanding while five found the sessions had improved their teaching; one is uncertain. Across the intervention the focus of teacher meetings appears to shift away from lesson planning and teaching strategies to math content sessions for several of the teachers. This does raise several questions. Do the teachers continue to work together on lessons plans and strategies? Do they perceive the purpose of the sessions differently at year end?

Most disagreed at mid-year and year-end that regular and tutoring teachers plan content together while half agreed that weekly meetings are used to align district curriculum with the TEKS.

In the open-ended responses about the math content sessions teachers, feedback at mid-year was more negative than positive. While two reported that the sessions made them more aware of additional representations available to them or different ways to look at things, others suggested that the sessions were helpful, but that the mathematician spoke at the wrong level. Several commented that the sessions were a waste of time. One who reported that they were helpful asked that the teachers plan with a component for ELL in their lessons. Another asked for extra or different lessons for the block classes. She suggests that they should be focused on planning for class and reviewing while someone who is an expert at writing lesson plans should be doing that for the whole group, instead of everyone reinventing the wheel. Finally a teacher requested more ideas for teaching pieces, not activities.

The open-ended comments about the math content sessions at year end were mostly positive. In essence, the teachers suggested that they gained depth of understanding so they could explain connections, understand sequencing or the proofs underlying a process. One teacher spoke of feeling overwhelmed by the material and thus better able to understand struggling student feelings. When asked about additional content that would be of use, two teachers requested more weekly planning meetings, another asked to discuss other teacher experiences with each unit or for the curriculum to be connected with the mathematician's content, or more and different use of manipulatives.

Assessment and Indicator Alignment

The level of agreement over the alignment of unit benchmarks to the district curriculum and the TEKS, and unit diagnostics to the district curriculum and the TEKS shifts slightly from mid-year to year-end. At mid-year, one to two teachers disagreed or were uncertain about alignment whereas by year end, two to three fell into this category with a fourth not responding.

Uncertainty about unit diagnostics helping teachers tailor instruction remained constant at two teachers (five agree) from mid-year to year-end. All teachers agreed at year-end that the more immediate availability of data had helped them improve instruction. One had been uncertain at mid-year.

Six of the teachers commented on using the diagnostic data to tailor instruction, re-teach or identify students who need more monitoring. Teachers commented that the diagnostic data helps them tailor their instruction by knowing what concepts require more (or less) time, to identify material that students should already know, and to design warm up's around what students don't know. The teachers reported that the unit diagnostics had changed instruction by allowing them to determine frame length and starting point, to move a weaker student closer to them or adjust the warm up's and quizzes to cover more review. Teachers commented that the immediate availability of data allowed them to spiral in concepts not mastered sooner and to provide extra practice through warm-ups. One teacher reported that the more timely feedback allowed her to conference with students quickly while trying to get them back on track.

While respondent agreement is often our focus, it may be helpful to know how many teachers are hesitant about the assessments or even resistant. At mid-year, one or two teachers seemed to

question the usefulness of the unit diagnostics and increased number of benchmarks. At year-end two teachers out of eight questioned the usefulness of increased assessment.

Let us consider performance expectations for the assessment vehicles. In the Efficacy section above we reported surprisingly high confidence among teachers about their ability to successfully teach as well as students' likelihood of learning. Teachers' confidence about student performance shifted from mid-intervention to year-end, with slightly more uncertainty about TAKS performance but far more confidence about district TEKS performance. In all six teachers were confident that students will do well on both.

Use and Impact of Technology

Teachers reported positive experiences with TI technology at mid-intervention and year-end. They used the TI-Navigator to collect data and help students understand math. Teachers reported being able to modify instructional strategies based upon real time data. They stated that student motivation has increased with the use of TI technology and that fewer behavioral problems must be referred to the office when the technology is used in the classroom. The number of teachers using the technology grew from six at mid-year to eight at year-end. Seven agreed that the use of technology has enhanced the district curriculum (up from six at mid-year).

When asked how the technology has changed classroom culture, teachers reported that anonymous submission of responses garners 100% participation, increased group participation and sharing of responses, and support in helping one another with the technology. Students were rarely tardy; they were more engaged and more was covered in class. Classroom management (screen capture) and immediate feedback (class analysis slide show) changed the culture.

How was teaching impacted by the technology? Teachers suggested that control shifts to the student, and that students' responsibility and confidence were boosted. Teachers reported better being able to manage time, focus on questioning skills and student discussion. More and higher level concepts were covered, more hands on activities and variety in activities were performed.

How was performance impacted by the technology? Teachers noted positive differences in focus at mid-year. "Students love to use the calculator, they get into a routine, so that keeps them focused on what is in front of them. The screen captures help as well." By year-end teachers reported that students spend more time working through a problem, were able to realize corrections more quickly and retain information. One commented, "their algebra readiness has increased with calculator experience." Another remarked, "they are learning more without even knowing it."

The 100 Minute Power Block

Reflections on the Power Block were positive and increasingly so as we move from mid-year to year-end. All the teachers agreed that the daily warm-up help students solve problems more effectively. At mid-year, however, there was less certainty that additional time made a real difference to student approaches to problem solving or to student self-esteem than at year end,

where teachers showed strong agreement that the increased time had changed problem approach and esteem.

The open ended responses provided by four of the teachers at mid-year suggested positive results from the Power Block, namely new found success by students in math, more student effort and questions, fuller understanding, increased quality of work and more time for class discussion. One teacher reported considerable frustration in claiming that teaching 29 low level students was very difficult. "I don't have any kids that have motivation."

At year-end comments about the power block were only positive with one teacher stating, "the extra time has given students the opportunity to truly grasp the content and apply it." Other comments addressed improvements in motivation and higher student expectations of themselves. Several teachers noted better performance and improved problem solving skills. "Their scores have gone way-up!" Teachers explained that students are more comfortable with class participation and thus more willing to attempt a problem. They suggested that because of the extra time, students will ask questions.

Project Support

The support that teachers list as most critical to this project included (in order of frequency mentioned) technology and technology training; Paula Moeller, her response to questions and ideas in the classroom; staff development including work with Jane Demaste, weekly planning meetings, activities and assessments, T3, the immediate help received and positive reinforcement.

What kinds of additional support would be helpful from TI?
(Suggestions at mid-year)
- Learning how to run block classes successfully
- Easy reading and explanations for first year teachers going through alternative certification.
- More training with the technology
- Manuals and lesson plans using TI-Navigator
- Instruction for using study cards including additional ways to use TI-Navigator.

What kinds of additional support would be helpful from TI?
(Suggestions at year-end)
- Opportunities to observe Navigator proficient teachers, not other adults
- Mock teaching of a block class, while teachers are students
- Easier access to curricular help, not just hardware. For example, uses for different applications and the easiest way to run them.
- More time in the classroom and team teaching
- Zero segregation within the department.

What kinds of additional support would be helpful from the district? (Suggestions at mid-year)
- Learning how to run block classes successfully
- Smaller class sizes
- Rearranging block classes so there are some high achievers, not all at risk students*

- Stricter administrative discipline*
- Prewritten lesson plans for new teachers
- Curriculum that matches the benchmarks more closely
- More ways to use manipulatives
- Navigator support within curriculum

(* Comments made by more than one teacher)

What kinds of additional support would be helpful from the district? (Suggestions at year-end)
- A curriculum that is better aligned with TEKS
- Understanding exactly what teachers are doing and that they are being successful
- Providing ideas, questions and explanations about how to teach with the curriculum planner

What kinds of additional support would be helpful from your principal and vice principal? (Suggestions at mid-year and year-end)
- More disciplinary support*
- Smaller blocks
- Mixing up the classes*
- Empathy for the teacher who is doing considerable extra work

(* Comments made by 4 or more teachers)

At mid-year, teachers commented that the class should seem more like a privilege, that the project is hard to implement with discipline problems where students cannot be sent to the office. A teacher asked that students be held accountable. The teacher remarked, "it seems like most kids are low achieving, have no aspiration or basic math skills… They have no idea what they are doing." Another reported that her students have "no one to look up to or strive to be". Many are repeating 8th graders, all failed TAKS and are low achievers. "I feel like these kids were set up to fail. The block classes were too large from the start. Also, kids should not be added to the class mid-year because their growth cannot be measured well.

At year-end, negative comments were about discipline and to a lesser degree about mixing up the blocks, as well as lack of administrative support and appreciation. Many teachers addressed the lack of disciplinary support and administrator appreciation.

Final Comments

Several of the teachers spoke of their gratitude for being able to learn from the TI employees, who are "so knowledgeable". Another remarked, "I really enjoyed being part of the program and even though frustrated at times, I was able to work through it because I had tons of TI support." Several spoke of enjoying the program. One remarked, "I love it! Love it! Love it! It is such a disservice to the rest of the classes that won't have the experience of the TI project and all its power. Hopefully, this will grow into the high schools in the very near future."

Another teacher reported feeling alienated, and one had difficulty connecting the high-level math content sessions to the curriculum. One reported that the equipment (the dongles and knobs) do

not work all the time, which was very frustrating. Finally, a teacher reminded the researchers, "the project needs to be in the hands of a capable teacher who is willing to learn and change their style of teaching. There are so many components to the intervention" that a capable worker is required.

Other potential issues that we need to address:

1. Is the interventions success due to factors besides the technology? This has two aspects, and as we move on to a larger number of schools we will be able to see if we can rule out other explanations. At this point however, the positive effects we are seeing may be due to simply moving to the double-block (100 minute) schedule, or they may be due to having Paula Moeller on-site and her additional efforts pushed this through. Subsequent evaluation should be able to tease apart the factors and give us firmer ideas on what it contributing to the improvement, but until we have more sites and an ability to isolate potential contributing factors, we will not be able to definitively state that the technology intervention has a main effect here.
2. Related to this, we will need to be sure that each site has someone that plays Paula's role as an evangelist of sorts, acting as a central coordinator and making sure that what Paula has done gets transferred to each new site. As we expand to more schools, Paula will not be able to be everywhere at once, but with the right amount and type of training she should be able to train successors. For next year, this is something that we will have to build into the planning process, to make sure that the district has a point person assigned to each new school, and that there is always a district level person who can provide assistance and funnel help and planning assistance from TI to the schools.
3. What is the best way to get teacher buy-in? The teachers at Lake Highlands now all seem to be behind the intervention, and we want to get this same amount of positive regard at the new campuses. We will need to be sure that there are enough chances for teachers to visit and experience the program, and that there is full acceptance during the summer months. The Lake Highlands principals suggested that we let their teachers communicate with other teachers about the program, schedule the observations time while students are working with the technology (and let students show the potential teacher recruits how things work so they get the students' point of view), and plan at least one event that might get the "buzz" started regarding this program more widely through the district.
4. As the project is expanded to other campuses, it will be important to remember that teacher expectations of themselves and their students are much lower at some campuses than Lake Highlands. Prior exposure, demonstration and support will be especially important.
5. While TI made excellent progress in adjusting the math content session mid-year, some teachers continue to ask that the sessions be tied more closely to the curriculum.

Appendix A: Year-End Teacher Survey

Identifying Components of Effective Mathematics Programs in RISD

Consent Form

The Richardson Independent School District and Texas Instruments Inc. has asked us to conduct a research study to extend previous work identifying components of successful mathematics programs while also helping the schools to better design the way mathematics is taught and technology utilized. We hope that through your participation, we will be able to provide valuable information to your district, identify ways that the district can better assist schools and teachers, and discover how schools can be more effective. Over the next few weeks, teachers, principals, mathematics specialists, and district personnel will all be asked to complete surveys that assess the characteristics of RISD schools and programs that relate to successful mathematics education nationally.

Participation requires the following:

• Completion of a survey on math practice and policy by all fourth and fifth grade teachers, middle school math teachers, all elementary and middle school principals, and district specialists in mathematics.

• Completion of a survey on mathematical knowledge by all teachers involved in math education for grades 4-8 at the campuses.

At the end of the study, a report will be sent to the district office and information will be sent to the schools' principals and mathematics specialists for dissemination.

The procedures here involve no or minimal risk to the participants. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Some tracking identification tied to assessments of mathematics knowledge and practices will be kept by the researchers to allow for future program evaluation. After deciding to participate, you are free to withdraw your consent and discontinue participation at any time without penalty. If you have any questions regarding the research, please feel free to Mara Winick (mara_winick@redlands.edu) or Jeffrey Lewis (jeff_lewis@pitzer.edu or 909-792-5594).

Your signature indicates that you have read and understand the information provided above, that you willingly agree to participate, that you may withdraw your consent at any time and discontinue participation without penalty, that you will receive a copy of this form, and that you are not waiving any legal claims, rights or remedies.

Name _____

Signature _____ Date _____

Teacher & Student Practices for Learning Math at RISD

1. Please respond to the following statements about teaching success by circling your level of agreement or disagreement.	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
a) I can successfully teach grade level math to 90% or more of my students.	SD	D	U	A	SA
b) I know which strategies work best for teaching math for English Language Learners.	SD	D	U	A	SA
c) I know which strategies work best for teaching African American students who are falling behind.	SD	D	U	A	SA
d) I am confident that 90% or more of my students can learn grade level math.	SD	D	U	A	SA
e) I have the instructional support necessary to be successful teaching all students math.	SD	D	U	A	SA
f) I receive instructional support in time to deliver math content successfully.	SD	D	U	A	SA
g) The instructional support I receive is based upon benchmark data.	SD	D	U	A	SA
h) It would be accurate to say that I inspire my students.	SD	D	U	A	SA
i) It is accurate to say that I establish a significant relationship with students who are having difficulty learning math.	SD	D	U	A	SA
j) I feel valued by the administration at this school.	SD	D	U	A	SA
k) My expectations for student performance have increased since receiving additional training this past summer and Fall.	SD	D	U	A	SA

l) Please comment on how the TI intervention model has assisted you in teaching mathematics to all students in class.

m) Which components of the TI intervention, if any, have helped raise your level of confidence in teaching all students?

2. Please respond to the statements below concerning teacher content knowledge and support, by circling your level of agreement or disagreement.	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
a) Our teachers meet weekly to plan lessons and discuss teaching strategies for meeting the needs of all learners.	SD	D	U	A	SA
b) Content sessions with the mathematician have increased my mathematical understanding.	SD	D	U	A	SA
c) Content sessions with the mathematician have helped me teach more effectively.	SD	D	U	A	SA
d) Weekly meetings are used to align the district curriculum with the TEKS.	SD	D	U	A	SA
e) Our teachers meet weekly to design grouping strategies for struggling students.	SD	D	U	A	SA
f) Regular and tutoring (CATS) teachers plan content together.	SD	D	U	A	SA

g) How, if at all, have the math content sessions changed what you know about math?

h) How have the math content sessions changed the way you teach math?

i) What other content, if any, would you like included in the weekly planning meetings?

3. Please respond to the following statements about assessment by circling your level of agreement or disagreement	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
a) Our unit benchmarks for assessing student growth are aligned to the district curriculum and the TEKS.	SD	D	U	A	SA
b) Our unit diagnostics are aligned to the district curriculum and the TEKS.	SD	D	U	A	SA
c) Our unit diagnostics help me tailor instruction to meet student needs.	SD	D	U	A	SA
d) Students in my class know the learning goals for each unit of study.	SD	D	U	A	SA
e) My students' parents know what is expected of their child during the school year.	SD	D	U	A	SA
f) The increased number of benchmarks has helped me improve instruction.	SD	D	U	A	SA
g) The more immediate availability of benchmark data has helped me improve instruction.	SD	D	U	A	SA
h) I feel confident my students will do well on the district TEKS checks assessments.	SD	D	U	A	SA
i) I feel confident that my students will master grade level content, measured by the TAKS, by the end of the school year.	SD	D	U	A	SA
j) Students in this school are held accountable for mathematics instruction.	SD	D	U	A	SA

k) Please explain how the use of unit diagnostic data has changed your teaching.

l) How does the diagnostic data enable you to tailor instruction to better meet student needs, if at all?

m) Please explain how the more immediate availability of benchmark data has changed your teaching, if at all.

4. Please respond to the statements below concerning parent involvement by circling your level of agreement or disagreement	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
a) I frequently communicate learning expectations to parents.	SD	D	U	A	SA
b) My students' parents understand the importance of learning math.	SD	D	U	A	SA
c) My students' parents feel welcome at this school.	SD	D	U	A	SA
d) Please share comments made by parents regarding the TI intervention model.					

5. Please respond to the below about use of technology in teaching by circling your level of agreement or disagreement	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
a) I use the TI Navigator to collect student data.	SD	D	U	A	SA
b) I use the TI-73 graphing calculator to help students understand mathematics content.	SD	D	U	A	SA
c) I am able to modify instructional strategies for individual students based on real time data collected through the TI Navigator.	SD	D	U	A	SA
d) I have found that student motivation has increased with the use of the TI technology.	SD	D	U	A	SA
e) I have found that fewer students are sent to the office for to behavioral problems when I use technology in my classroom.	SD	D	U	A	SA
f) It is clear to me that the use of technology has enhanced our district curriculum.	SD	D	U	A	SA
g) Please explain how the use of technology has changed your classroom culture or learning environment.					
h) How has the use of technology changed your teaching, if at all? Please explain.					

i) How has the use of technology changed student performance, if at all? Please explain.

6. Please respond to the statements below about the 100 minute power block for teaching math.	**Strongly Disagree**	**Disagree**	**Uncertain**	**Agree**	**Strongly Agree**
a) The daily warm-up is helping students solve problems more effectively.	SD	D	U	A	SA
b) The additional time spent on problem solving has made a real difference in how students approach solutions to difficult problems.	SD	D	U	A	SA
c) Additional class time has increased my students' self esteem in mathematics.	SD	D	U	A	SA

d) Please comment on any changes you have noticed in student performance as a result of the 100 minute power block.

7. What types of support from this project have been most critical to increasing student performance in your classrooms?

8. What kinds of additional support from TI would make a difference to your success in teaching math?

9. What kinds of additional support from the district would make a difference to your success in teaching math?

10. What additional administrative support from your principal and vice principals is needed to help you implement the goals of the TI project?

11. Do the administrators on your campus understand the amount of time that is required to plan and execute the goals of the TI project? Please explain.

12. Do you have particular concerns about the project that the researchers would benefit from knowing? Has participation brought moments of joy, frustration? Please comment.
13. Finally, is there any other information that you would like to share with the researchers about the TI project?

Thank you for taking the time to help math educators learn from one another.

Appendix B: Survey Response Detail for closed-end questions (Lake Highlands only)

1. Please respond to the following statements about teaching success by circling your level of agreement or disagreement.

		Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree	Total
		Percent	Percent	Percent	Percent	Percent	Count
Lake Highlands	I can successfully teach grade level math to 90% or more of my students.				50%	50%	8
	I know which strategies work best for teaching math for English Language Learners.		13%	25%	63%		8
	I know which strategies work best for teaching African American students who are falling behind.			38%	38%	25%	8
	I am confident that 90% or more of my students can learn grade level math.		14%		43%	43%	7
	I have the instructional support necessary to be successful teaching all students math.		13%		63%	25%	8
	I receive instructional support in time to deliver math content successfully.		38%		38%	25%	8
	The instructional support I receive is based upon benchmark data.		13%	38%	38%	13%	8
	It would be accurate to say that I inspire my students.			13%	63%	25%	8
	It is accurate to say that I establish a significant relationship with students who are having difficulty learning math.			13%	25%	63%	8
	I feel valued by the administration at this school.	38%	13%		38%	13%	8
	My expectations for student performance have increased since receiving additional training this pas summer and Fall.			25%	63%	13%	8

2. Please respond to the statements below concerning teacher content knowledge and support, by circling your level of agreement or disagreement.

		Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree	Total
		Percent	Percent	Percent	Percent	Percent	Count
Lake Highlands	Our teachers meet weekly to plan lessons and discuss teaching strategies for meeting the needs of all learners.	13%	25%	25%	38%		8
	Content sessions with the mathematician have increased my mathematical understanding.		13%	13%	75%		8
	Content sessions with the mathematician have helped me teach more effectively.		25%	13%	63%		8
	Weekly meetings are used to align the district curriculum with the TEKS.	13%	38%	25%	25%		8
	Our teachers meet weekly to design grouping strategies for struggling students.	13%	63%	13%	13%		8
	Regular and tutoring (CATS) teachers plan content together.	38%	38%	13%	13%		8

3. Please respond to the following statements about assessment by circling your level of agreement or disagreement.

		Disagree	Uncertain	Agree	Strongly Agree	Total
		Percent	Percent	Percent	Percent	Count
Lake Highlands	Our unit benchmarks for assessing student growth are aligned to the district curriculum and the TEKS.	29%		71%		7
	Our unit diagnostics are aligned to the district curriculum and the TEKS.	29%	14%	57%		7
	Our unit diagnostics help me tailor instruction to meet student needs.		29%	57%	14%	7
	Students in my class know the learning goals for each unit of study.	13%		63%	25%	8
	My students' parents know what is expected of their child during the school year.		13%	25%	63%	8
	The increased number of benchmarks has helped me improve instruction.		29%	57%	14%	7
	The more immediate availability of benchmark data has helped me improve instruction.			86%	14%	7
	I feel confident my students will do well on the district TEKS checks assessments.	13%	13%	63%	13%	8
	I feel confident that my students will master grade level content, measured by the TAKS, by the end of the school year.		25%	50%	25%	8
	Students in this school are held accountable for mathematics instruction.	38%		25%	38%	8

4. Please respond to the statements below concerning parent involvement by circling your level of agreement or disagreement.

		Disagree	Uncertain	Agree	Strongly Agree	Total
		Percent	Percent	Percent	Percent	Count
Lake Highlands	I frequently communicate learning expectations to parents.		13%	50%	38%	8
	My students' parents understand the importance of learning math.	13%	13%	13%	63%	8
	My students' parents feel welcome at this school.		25%	38%	38%	8

5. Please respond to the below about use of technology in teaching by circling your level of agreement or disagreement.

		Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree	Total
		Percent	Percent	Percent	Percent	Percent	Count
Lake Highlands	I use the TI Navigator to collect student data.				38%	63%	8
	I use the TI-73 graphing calculator to help students understand mathematics content.				43%	57%	7
	I am able to modify instructional strategies for individual students based on real time data collected through the TI Navigator.				38%	63%	8
	I have found that student motivation has increased with the use of the TI technology.				38%	63%	8
	I have found that fewer students are sent to the office for to behavioral problems when I use technology in my classroom.		25%		13%	63%	8
	It is clear to me that the use of technology has enhanced our district curriculum.		13%		50%	38%	8

6. Please respond to the statements below about the 100 minute power block for teaching math.

		Strongly Disagree	Uncertain	Agree	Strongly Agree	Total
		Percent	Percent	Percent	Percent	Count
Lake Highlands	The daily warm-up is helping students solve problems more effectively.			43%	57%	7
	The additional time spent on problem solving has made a real difference in how students approach solutions to difficult problems.			50%	50%	8
	Additional class time has increased my students' self esteem in mathematics.		14%	29%	57%	7